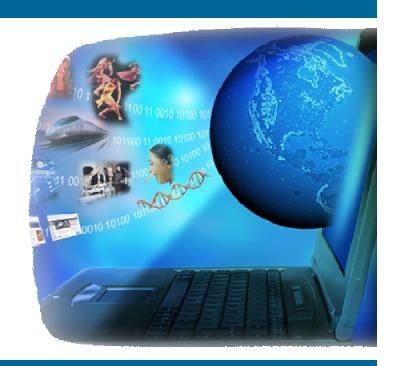# Dynamic IMS Recovery

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IMS Recovery Expert for z/OS

Product Overview

IMS Recovery Expert Overview

IMS Recovery Expert for z/OS, V1.1 is a new addition to the IMS Tools product portfolio

Provides features that work to ensure that your IMS database environment is recoverable <u>BEFORE</u> you ever need to do a recovery

Does not perform the actual database recovery; IMS Database Recovery Facility is the recommended tool for performing IMS database recoveries

Product is being positioned to interface with the IMS Database Recovery Facility product

IMS Recovery Expert Overview

Provides six unique features which can be used to:

➢ Create clean recovery points

➢ Locate existing recovery points

➢ Identify problems which may affect recoveries

➢ Verify required recovery assets

➢ Condition RECON data sets for disaster recovery

➢ Issue IMS commands in batch

IMS Recovery Expert Product Information

IMS Recovery Expert consists of the following product FMIDs

➢ HACX110 IMS Recovery Expert (COMPID 5655R2600)

➢ H32A120 IMS Tools Generic Exits (COMPID 5655P0101)

➢ H2B7120 IMS Tools Online System Interface (COMPID 5697E9901)

HACX110 IMS Recovery Expert

➢ IMS Recovery Expert for z/OS User's Guide (SC18-9873)

➢ Valid for IMS V9.1 (5655-J38) with APAR PK51813

➢ Post-GA PTF UK32102 (APAR PK57396) fixes minor problems

H32A120 IMS Tools Generic Exits

➢ Contains common code which is shared among multiple IBM IMS Tools

➢ Documentation is included as an appendix to the IMS Recovery Expert User's Guide

H2B7120 IMS Tools Online System Interface

➢ Contains common code which is shared among multiple IBM IMS Tools

➢ Documentation is included as an appendix to the IMS Recovery Expert User's Guide

IMS Recovery Expert also requires the customer to have the IMS Tools Knowledge Base for z/OS, V1.1 (5655-R34) installed

IMS Recovery Expert Execution Environments

IMS RE currently supports IMS version 9 with APAR PK51813

> PK51813 fixes a problem related to the VERIFY function

IMS version 10 support is being prepared and should be available by end of 1Q08

IMS version 8 is not supported

IMS RE supports all types of IMS environments:

> Simple, single system

> IMS Data Sharing

> IMSPlex

> IMS DB/TM, DBCTL, and DCCTL

IMS Recovery Expert Components

IMS Recovery Expert Batch Job

➢ Operates as a batch job which you can submit or schedule on a regular basis

➢ Job is control card driven to indicate which features are performed

IMS Tools Knowledge Base Server (ITKBSRVR)

➢ IMS Tools KB is required and the server must be active in order for any IMS Recovery Expert job to execute

IMS Control Region

➢ IMS Recovery Expert has a presence in the IMS Control Region for pausing CICS/ODBA threads and is established via the IMS Partner Exit (DFSPPUE0)

➢ IMS Recovery Expert also uses the IMS Tools Online System Interface which also establishes a presence using DFSPPUE0

Batch Message Processing Region (BMP)

➢ IMS Recovery Expert requires a presence in BMPs for pausing them at checkpoint time and is established through an SMP/E USERMOD

IMS Tools Knowledge Base Integration

IMS Recovery Expert requires the use of the IMS Tools Knowledge Base

IMS Tools KB is used for input:

➢ RECONID record contains information associated with each execution environment:

- RECON data set names
- IMS Tools Online System Interface XCF group
- IMSPlex name
- IMS Command security information

IMS Tools KB is used for output:

➢ Reports generated by IMS Recovery Expert functions can be saved for later viewing

IMS Tools KB provides an ISPF interface for maintaining RECONID records and viewing and maintaining reports

IMS Recovery Expert Features

IMS Recovery Expert consists of six features:

➢ IMS Command Interface (IMSCMD)

➢ Health Checker (HCHECK)

➢ Recovery Point Creation (RPCR)

➢ Recovery Point Identification (RPID)

➢ Verify Recovery Assets (VERIFY)

➢ RECON Data Set Cleanup (RCU)

And two supporting functions:

➢ RECON Data Set Copy (RECONCOPY)

➢ Database List (DBLIST)

RECON Data Set Copy - RECONCOPY

➢ This feature creates a copy of the live RECON data sets prior to the IMS Recovery Expert feature executing.

➢ The IMS Recovery Expert feature will access the RECON copy data sets instead of the live RECON data sets.

➢ This process uses the DBRC BACKUP.RECON RECON1 command, so that whichever copy of the RECON data set is COPY1 is used. This process then makes a second and third copy using IDCAMS REPRO and allocates them to the RECON1, RECON2, and RECON3 DD statements.

➢ This feature eliminates the impact of IMS Recovery Expert processing on production workloads.

➢ RECONCOPY is valid for all features except for Recovery Point Create (RPCR) and IMS Command (IMSCMD).

➢ RECONCOPY is required for RECON Data Set Cleanup (RCU).

➢ RECON copies can be deleted at job step termination or left allocated and cataloged.

Database List - DBLIST

➢ Most IMS Recovery Expert features require you to specify which databases, database data sets, areas and/or partitions are to be processed

➢ DBLIST allows you to specify one or more databases, database data sets, fast path areas, HALDB partitions, RECON DBDS groups, RECON Change Accumulation groups, or RECON Recovery groups

➢ The DBLIST is pre-processed using the DBRC Application Programming Interface (DSPAPI) to access information in the RECON data sets

➢ DBLIST entries are validated, expanded and passed to the requested IMS Recovery Expert features

➢ All entries in the DBLIST must be defined to the RECON data sets

➢ Invalid entries are reported

IMS Command Interface - IMSCMD

➢ IMS Command (IMSCMD) feature provides an interface for executing IMS type 1 AOI commands in a batch environment

➢ Output of the command is written to RPTIMSCM and the IMS Tools Knowledge Base if requested

➢ Requires IMS Tools Online System Interface (TOSI) to be installed in every IMS Control Region to which commands are issued

➢ The TOSI XCF group determines the list of available IMS Control Regions for command execution

➢ You can direct commands to specific IMS Control Regions or to all active IMS Control Regions

➢ IMS Command security is provided

- None   : intended for test environments only
- APPL   : application class security
- IMS   : IMS resource class security

Health Checker - HCHECK

➢ Identifies a number of problems that can impact IMS database recovery

➢ Accesses information in the RECON data sets and z/OS catalog

➢ You can individually request which items are to be health checked

➢ There is currently a list of over 20 items which can be health checked

➢ You can set up jobs for key items which need to be checked and scheduled to run on a regular basis

Health Checker - HCHECK

Items currently processed by Health Checker:

➢ Image copy needed or recommended

➢ No batch or online image copy within a specified time frame

➢ Databases which have extended error queue elements (EEQE)

➢ Databases not in any change accumulation group

➢ HALDB is not initialized

➢ No area data set defined

➢ No area data set available

➢ Databases which indicate backout needed

➢ Minimum number of change accumulation records are not available

Health Checker - HCHECK

Items currently processed by Health Checker:

➢ No valid corresponding SECLOG entry for PRILOG record

➢ No valid corresponding SECSLDS entry for PRISLDS record

➢ Change accumulation group does not have a valid change accumulation run within a specified time range

➢ Object is in prohibit authorization state

➢ Primary image copy does not have a corresponding valid secondary image copy within a specified time range

➢ Disabled HALDB partition

➢ Verify recovery assets are cataloged

Recovery Point Create - RPCR

➢Creates recovery points for one or more databases by issuing synchronized /DBR or /DBD commands using IMS Tools Online System Interface

➢Causes the allocation records in the RECON data sets to be updated, indicating a period of time where the database is not allocated by an IMS subsystem, thus creating a valid recovery point

➢Recovery points can be used to perform timestamp recovery (TSR) or full recovery

➢By specifying multiple databases, you can create recovery points at the application level

Recovery Point Create - RPCR

➢ Optionally issues a /SWI OLDS command across all IMS Control Regions to create a synchronized set of archived log data sets

➢ Optionally restarts databases after recovery point is created

➢ RPCR provides interfaces for pausing CICS/ODBA threads and BMPs which are accessing databases

➢ RPCR ensures that the databases being processed are not in use

- Issues DBRC CHANGE.DB NOAUTH

- Dynamically allocates data sets DISP=OLD

- Issues ENQ to communicate with CICS/ODBA and BMP interfaces

Recovery Point Identification - RPID

➢ Analyzes database allocation records in the RECON data sets to identify recovery time spans to which one or more databases can be recovered using timestamp recovery (TSR)

➢ A recovery time span (RTS) is a period of time during which a database is not allocated and therefore, the database can be recovered

➢ Although valid recovery times might exist during which the database is allocated, RPID does not currently analyze log records and therefore, does not report on these recovery times

➢ When RPID lists the recovery time spans, it also indicates specific recovery points (timestamps) that are available for recovery including:

- Times of complete change accumulation runs

- Times of batch image copy runs, and times of online image copy runs when the databases are not allocated

- Times of offline reorganizations and online reorganizations when the databases are not allocated

- Times of database recovery, either full or partial recoveries

Verify Recovery Assets - VERIFY

➢ Examines the RECON data sets and identifies the recovery assets that are required to recover one or more databases

➢ Recovery assets include image copies, change accumulations, and archived log data sets

➢ VERIFY ensures that the necessary data sets exist and that they are usable

➢ Performs one or all of the following functions:

  ▪ Lists the recovery assets that are required to recover the specified databases

  ▪ Allocates all recovery assets in order to ensure that they exist

  ▪ Opens all recovery assets to ensure that they are valid

RECON Data Set Cleanup - RCU

➢ Prepares the RECON data sets for database recovery at a disaster recovery site (DR)

➢ In order to perform valid recoveries at a DR site, a copy of the RECONs need to be made and modified to match the recovery assets at the DR site

➢ A recovery site must contain all the data needed to restore IMS databases to a known active site time. The data needed for recovery are:

- Image copy data sets taken at the active site

- IMS log data from the active site (Logs and/or Change accumulation datasets)

- A RECON which accurately reflects activities which have taken place at the active site

IMS Recovery Expert for z/OS

Usage Scenarios

Create clean database recovery points

Problem: You have a critical application which includes 10 related databases and you need to be able to create a consistent recovery point for the application.

Solution: The Recovery Point Create (RPCR) function can be used to automatically bring all 10 databases offline (via synchronized /DBR or /DBD), ensure that all are successfully deallocated and then bring them back online. The result is a point in time that all 10 databases are unallocated which can be used for a timestamp or full recovery.

The Recovery Point Identification (RPID) function can be used to verify that there is a common recovery time for all 10 databases.

When used in combination with the IMS Database Recovery Facility Incremental Image Copy feature, the result is a new batch image copy, without the overhead of having to keep the databases down while the image copy executes.

Verify the recoverability of databases

Problem: You don't want to wait until you need to do a database recovery to find out that one or more needed data sets are missing or invalid.

Solution: The Health Checker (HCHECK) function can be used to ensure that image copies and change accumulations are being run for key databases and that they are being run in a timely fashion. Specifically, the following HCHECK options would be beneficial:

- An image copy is needed or recommended
- A database is not in a change accumulation group
- No valid change accumulation data set exists within a timeframe that would allow for a quick recovery

The Verify Recovery Assets (VERIFY) function can be used to locate all of the data sets that would be needed to recover one or more databases and then check to make sure the data sets exist and are valid. If any image copy, change accumulation or log data sets are missing, not cataloged, or invalid, VERIFY will identify them so that the problem can be fixed before needing to run a recovery.

Ensure related databases have common recovery times

Problem: When a database must be recovered, many times multiple, related databases must also be recovered to a common recovery time in order to ensure data integrity.

Solution: The Recovery Point Identification (RPID) function can be used to identify common recovery time spans for one or more IMS databases. RPID will identify individual time spans to which the databases can be recovered and will also list all recovery time spans which are common to all of the databases in the list. RPID will also list all activities which are related to recovery points including change accumulations, image copies, reorganizations and prior recoveries.

If you find that there are no common recovery time spans for these related databases, the Recovery Point Create (RPCR) function can be used to generate a common recovery point.

Prepare your disaster recovery site for performing database recoveries

Problem: You ship a copy of your RECON data sets over to your disaster recovery site on a daily basis and need to modify them to match your disaster recovery environment.

Solution: The RECON Clean Up (RCU) function can be used to modify the RECON data sets that reside at the disaster recovery site to make them match the recovery environment. RCU accepts a cleanup timestamp as input for this process. RECON records are either deleted or changed to remove information that is later than the clean up time specified. Once RCU completes, you can generate the necessary recovery JCL needed to perform the actual recoveries.

Other IMS Recovery Expert functions can provide benefits when used at the disaster recovery site. For example, the VERIFY function can be used to identify missing or invalid recovery data sets. Also several of the HCHECK options can provide useful information at the disaster recovery site such as identifying missing recovery assets or other errors which will affect recovery.

Summary

➢ **When an IMS database needs to be recovered, it's too late to find out there are problems that will affect the recovery.**

➢ **The best use of time and resources is to identify and correct problems before you ever need to do a recovery.**

➢ **IMS Recovery Expert for z/OS is a tool that can help you detect and correct problems that prevent successful database recovery when you have the most time – BEFORE the recovery is needed.**

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